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**Subject: The Village at Institute Road
Definitive Plan Review**

EXHIBIT 26

Dear Joe:

We received the following documents in our office February 22, 2017:

- Correspondence from Guerriere & Halnon, Inc. to the Grafton Planning Board dated February 21, 2017, regarding The Village at Institute Road, Response to Definitive Plan Review.
- Correspondence from Guerriere & Halnon, Inc. to the Grafton Planning Board dated February 21, 2017, regarding The Village at Institute Road, Definitive Application, Waiver Requests.
- Plans entitled The Village at Institute Road a Conventional Subdivision in Grafton, Massachusetts dated September 16, 2016 and revised February 14, 2017, prepared by Guerriere & Halnon, Inc. for D&F Afonso Builders, Inc. (32 sheets)
- Document entitled Stormwater Report "The Village At Institute Road" in Grafton, MA dated September 13, 2016 and revised February 2, 2017, prepared by Guerriere & Halnon, Inc. for D&F Afonso Builder Corp.

Graves Engineering, Inc. (GEI) has been requested to review and comment on the plans' conformance with applicable "Rules and Regulations Governing the Subdivision of Land; Grafton, Massachusetts" revised through April 27, 2009; "Grafton Zoning By-Law" amended through May 9, 2016; Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Handbook and standard engineering practices on behalf of the Planning Board. As part of our initial review, GEI visited the site entrance on April 1, 2016.

This letter is a follow-up to our previous review letter dated November 8, 2016. For clarity, comments from our previous letter are *italicized* and our comments to the design engineer's responses are depicted in **bold**. Previous comment numbering has been maintained.

Our comments follow:

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Subdivision Rules and Regulations

1. *One waiver was requested. GEI reviewed the waiver request and the plans; we do not have technical concerns with the request to use low profile "Cape Cod" berm (§4.2.1.2) as long as vertical granite curb is used at the intersection radii and cul-de-sacs (as currently proposed) and as long as granite curb inlets are used at the catch basins (not currently proposed). We understand that the Planning Board will address any waiver requests. If this waiver is to be granted, then the plan-view sheets will need to be revised to show granite curb at the catch basins, the catch basin construction detail will need to be revised to specifically require a granite curb inlet and the "Curb Transition Detail" on Sheet 26 will need to be revised to show a non-chamfered (aka "tip-down") transition curb instead of a chamfered transition.*

The plans were revised, but need to be further revised to be fully coordinated with the waiver requests. We don't have an issue with the waiver requests, they now propose a mix of bituminous Cape Cod berm, sloped granite edging (referred to on the plans as "sloped granite curb" and "sloped granite curbing") and vertical granite curb. The waiver requests ask for the use of Cape Cod berm at the Brooke Street cul-de-sac but Sheets 12 and 18 show a curbing line-type that is the same as vertical granite curbing at the Dylan Way cul-de-sac shown on Sheet 14. As for transitions, "tip down" stones are needed for transitions from vertical curb to Cape Cod berm and chamfered stones are required for transitions from vertical curb to sloped granite edging. Sheet 29 of the plans only proposes one type of transition stone – a "tip down" but instead of transitioning to Cape Cod berm, it proposes transitioning to sloped granite edging. The transition stone detail needs to be revised and a second transition stone construction detail needs to be provided.

Lastly, the "Catch Basin Detail" construction detail (Sheet 30) must be revised to specifically require a granite curb inlet instead of vertical granite curbing.

2. *Sheets 23 and 24 of the plan set must be revised to include north arrow. (§3.3.3.6)*
Acknowledged. The plan sheets were revised to include a north arrow.
3. *Bounds were only proposed along the rights-of-way. The plans must be revised to also include bounds at all angle points along the easements, access routes and open space areas. (§3.3.3.10 & §3.3.3.17 & §4.8.1)*
Although the design engineer responded that the plans were revised, no bounds are proposed at the easements or at the parcels (Parcels A, B and C). The plans need to be revised accordingly.
4. *Notice of any and all decisions, special permits (i.e. Major Residential Special Permit), etc. must be identified on the plans. (§3.3.3.13)*
Acknowledged. Sheets 2 through 8 were revised to identify a notice of decisions and special permits.
5. *The words "Deeds of Easements to be Recorded Herewith" must be included on each plan sheet. (§3.3.3.15)*
The words "Deeds of Easements to be Recorded Herewith" were added to Sheets 2-8. This language must be added to all plan sheets (including Sheets 1 and Sheets 9 to 32) unless directed otherwise by the Planning Department.

6. *The plan and profile sheets must be revised to include the existing and proposed elevations shown at every twenty-five (25) foot interval along vertical curves (Sheets 16-19 and 22). (§3.3.3.16.b)*

Acknowledged. The plan and profile sheets (Sheets 16, 17, 18, 19 and 22) were revised to include the existing and proposed elevations at twenty-five (25) intervals along the vertical curves.

7. *The plans must be revised to include profiles of all walkways, specifically the walking paths off of Lot 7, Lot 14, and Lot 39. (§3.3.3.16.c)*

Acknowledged. The plans were revised to include profiles of the walking paths.

8. *The regulations require that elevations be based on the National Geodetic Vertical Datum of 1929. The datum used for the project is based on the 1988 N.A.V.D. We don't have an issue with the use of 1988 N.A.V.D. but we defer to the Planning Board whether this is acceptable. (§3.3.3.16.d)*

Acknowledged. A waiver from this requirement was requested. We understand that the Planning Board will address waiver requests. Again, GEI does not have an issue with the use of 1988 N.A.V.D.

9. *The plan sheets must be revised to show the locations (with labels) where the roadway and stormwater basin soil test pits were excavated. (§3.3.3.18.a)*

Acknowledged. The locations of the soil test pits were added to the Grading Sheets and the soil test pit results were included on Sheet 32. While the soil test pits were not specifically labeled on the grading sheets, the descriptions provided on the Sheet 32 adequately identify the test pit locations. It appears that the test pit results are missing from Sheet 32 for testing performed at Road B station 18+00; however, the design engineer has provided an adequate amount of soil testing information.

10. *The plans must be revised to include a preliminary location for the electric, telephone, and cable lines. GEI understands that this location may change depending upon the utility companies' designs (i.e. NGRID, Charter). (§3.3.3.18.c)*

Acknowledged. The preliminary location for the electric, telephone, and cable lines were added to Sheets 3 through 8.

11. *GEI has recently been authorized to review and comment on the project's conformance with applicable Conservation Commission "Regulations Governing Stormwater Management" or Conservation Commission "Rules and Regulations for the Administration of the Town of Grafton Local Wetlands Bylaw of 1987". GEI will issue a letter under separate cover. (§3.3.3.19.a & §3.3.3.19.d)*

No further comment.

12. *The Engineer must provide pipe design flow calculations using the Rational Method for the 25-year storm event. (Rules and Regulations Governing the Subdivision of Land §3.3.3.19.d & Regulations Governing Stormwater Management §6.B.3.a)*

The Engineer provided pipe design flow calculations for a portion of the drainage system (XC-DMH-1 to XC-DMH-3; DMH9 to DMH-17; DMH-18 to DMH-17; DMH1 to DMH-4; DMH-4 to DMH-5A; and DMH-5A to DMH-5). The Engineer must provide pipe design flow calculations for the entire proposed drainage system (CB1 through CB33; DMH6 to HWB1; DMH8 to DMH16; the cross-

country drainage system to the proposed stormwater management system behind Lot 16). Also, the submitted pipe design flow calculations show that the water velocity exceeds ten (10) feet per second (fps) at the four pipe segments between DI-2 and DMH-3. This drainage system must be revised so that the water velocity in the pipes is between two (2) fps and ten (10) fps per Regulations Governing Stormwater Management §6.B.3.d. Finally, the submitted pipe design flow calculations for the pipe between DMH-3 and DMH-4 use an incorrect pipe size, the calculations must be revised to be consistent with the plans.

13. *The species and location of proposed street trees must be identified on the plans. (§3.3.3.20)*

Acknowledged. The "Standard Road Cross Section" construction detail (Sheet 29) was revised to include the proposed locations of the street trees and a note stating that the Planning Board will determine the species.

14. *The following construction details must be added to the plans: Pavement Markings, Guard Rail, Monument, Roof Drainage Recharge Chambers, Concrete Sidewalk, Cape Cod Berm and Erosion Control Blankets. (§3.3.3.21.b)*

The plans were revised to include a guard rail, monument, roof drainage recharge chamber, concrete sidewalk, and cape cod berm construction details. As for the monument construction detail, the monument material (concrete) and length (36") do not comply with the Subdivision Rules and Regulations. Also, per Planning Department policy, the tops of the monuments must be installed flush in grassed areas or 6" to 9" above finished grade in wooded areas. The construction detail calls for the tops of bounds being set one foot above finished grade. The "Monument" construction detail must be revised.

15. *The Standard Road Cross Section construction detail on Sheet 26 needs to be revised to show the correct concrete sidewalk thickness and to show gravel under the sidewalk. The Rules and Regulations Governing the Subdivision of Land require that the concrete sidewalk comply with Massachusetts Highway Department (MHD) specifications (i.e. the concrete sidewalk must be four-inches thick). (§3.3.3.21.b & §5.5)*

Acknowledged. The "Standard Road Cross Section" construction detail (Sheet 29) was revised to show a 4-inch thick concrete sidewalk and to show gravel under the sidewalk.

16. *The Subdivision Rules and Regulations require street lights at all intersection and every three hundred (300) feet. The plans currently show street lights at the intersections and cul-de-sacs but not at every three hundred (300) feet. We understand that the applicant will have to coordinate the final street light locations with the Grafton Board of Selectmen. (§4.7.6)*

The design engineer responded that the street light locations will be coordinated with appropriate authority.

17. *The locations of Catch Basin #15 (Brook Street Sta. 5+50) and Catch Basin #22 (Brook Street Sta. 12+50) as shown on Sheet 14 are located within driveway curb cuts. The Engineer must revise the locations of these driveway curb cuts or catch basins. (§4.7.8.3)*

Acknowledged. The driveway locations on Brooke Street (near Catch Basin #22 and Catch Basin #15) have been revised.

18. *The plans must be revised to show a concrete sidewalk across the driveways. (§4.9.1)*

Acknowledged. Sheets 16 through 19 now include a note that concrete sidewalks are to be installed across the proposed driveways.

19. *The plans show that Parcel C is dedicated to be an access/walkway path, with a proposed slope of approximately 25%. The slope of the access/walkway path must be revised. The pathway must have a slope equal to or less than eight (8) percent. (§4.10.4)*

The Engineer revised the grading for the access/walkway path to Parcel C, however the slope still exceeds eight (8) percent and proposes a 2H:1V slope at the upper end of the path. Sheet 24 shows a note requesting a waiver from the slope requirement, however this is the only reference to such a waiver request. If the Engineer wishes to request a waiver from this requirement, they should address it within the waiver request letter, and in our opinion the 2H:1V slope should be revised to be similar to the grade elsewhere on the path.

20. *The Engineer must revise the drainage pipe design to provide at least four (4) feet of cover over all drain pipes or provide Class V RCP pipe on the full length of drain lines that have less than four feet of cover anywhere along the line. Based on the plan and profile sheets, GEI estimated that the drainage pipe has less than four (4) feet of cover at the following locations: Audrina Lane Sta 4+80 to Sta. 8+35; Brook Street Sta. 0+05 to Sta. 0+45 and Sta. 16+60 to Sta. 18+85; Dylan Way Sta. 0+00 to Sta. 2+15. (§5.4.2.2)*

This comment was not addressed in its entirety. The proposed drainage system has been revised, however a minimum of four (4) feet of cover was not provided over all of the drain pipes nor do the plans note that Class V RCP pipe is to be used at all of the shallow cover locations. Based on the plan and profile sheets, GEI estimated that the drainage pipe has less than four (4) feet of cover at the following locations: Brooke Street Sta. 17+75 to Sta. 18+68; Dylan Way from CB-30 to DMH-7 and from CB-31 to DMH-7; and on the cross-country drain line from Sta. 2+75 to Sta. 3+84.

Hydrology & Stormwater Management Review

21. *The Engineer must revise the runoff curve numbers in the hydrology calculations that model "poor" ground cover (i.e. less than 50% ground cover). All pervious ground cover on the site must be assumed to be in "good" hydrologic condition (greater than 75% ground cover). Furthermore, based upon our visual observations at the site, the site consists of good ground cover. (Rules and Regulations Governing the Subdivision of Land §3.3.3.19.d & Regulations Governing Stormwater Management §6.B.3.j)*

Acknowledged. The runoff curve numbers in the hydrology calculations have been revised; the curve numbers now model the ground cover as being in "good" condition.

22. *There is significantly less total land area modeled in the post-development hydrology calculations compared to the pre-development calculations; the difference is 595,700*

square feet or approximately 13.7 acres. The total land areas must be consistent unless justified otherwise (e.g. if roof runoff for all storm events is to be collected and infiltrated with no overflow to the ground surface and supporting documentation is submitted to demonstrate such).

The hydrology calculations were revised; however the pre-development land area is still 134,024 square feet (or approximately 3.08 acres) greater than the post-development land area. Furthermore, with the submittal of revised pre- and post-development drainage areas plans, we were able to further review the limits of the project's subcatchments. We disagree with the limits of the subcatchments at the southeast corner of the site (the southern parts of pre-development Subcatchments #1E and #2E and post-development Subcatchments #1P and #2).

First, the limits of the pre-development subcatchments extend approximately 300 feet farther south than the limits of the post-development subcatchments, thereby encompassing approximately 155,000 square feet (3.5 acres) of land. More importantly, in the pre-development conditions there is a drainage divide that separates north-flowing stormwater from south-flowing stormwater. This drainage divide passes through the existing high point (elevation 448+) at Brooke Street station 1+50+/- . Stormwater from the western portion of Lot 1, all of Lots 2 and 3, and the southern portions of Lots 4 and 5 flows southerly instead of northerly. The design engineer needs to review the subcatchment delineations and revise the hydrology calculations as necessary.

23. *In the post-development hydrology calculations, Subcatchment DA#3P was modeled with 127,629 square feet (sq. ft.) of impervious area. We estimated a total of 226,000 sq. ft. of impervious area in this subcatchment (112,000 sq. ft. for the roads and sidewalks, 80,000 sq. ft. for the house lots and 34,219 sq. ft. of off-site area as modeled in the pre-development hydrology calculations). The amount of impervious area needs to be reviewed by the Engineer and revised as necessary.*

Acknowledged. The hydrology calculations were revised; the impervious area modeled in the calculations is reasonable.

24. *In the post-development hydrology calculations, Subcatchment DA#3P was modeled as discharging stormwater to the proposed infiltration basin (Pond 5P in the calculations). As delineated, Subcatchment DA#3P contains a significant amount of area that is not tributary to the infiltration basin. The post-development hydrology calculations need to be revised to exclude non-tributary area from the infiltration basin modeling and instead model the non-tributary area as a separate subcatchment.*

Acknowledged. The Subcatchment DA #3P was revised to be multiple subcatchments. The revised Subcatchment DA #3P will discharge to Basin #1 (formerly Pond 5P) and was modeled as such.

25. *In the post-development hydrology calculations, the modeling of the infiltration basin (Pond 5P) must include the outlet pipe. The outlet control structure has three inlet orifices in parallel and one outlet pipe in series with the three orifices. As currently configured the outlet pipe appears to be more restrictive to flow than the three orifices.*

The hydrology calculations were not revised to address this comment. The calculations must model both this outlet pipe and the outlet pipe for Basin #2, a new basin.

26. *The Plan View Basin Detail (Sheet 27) shows a 12" orifice at invert elevation 377.5, however in the hydrology calculations this is an 18" orifice. The size of the orifice on the plans must be consistent with the hydrology calculations.*

Acknowledged. The Plan View Detail and hydrology calculations were revised and they are now consistent.

27. *The hydrology computations indicate that Basin #1 would discharge stormwater over the emergency spillway during the 100-year storm. Infiltration basins must be designed so that they do not use the emergency spillway for design storm discharges; the Engineer must revise as necessary.*

The hydrology calculations were revised however Basin #1 will still discharge stormwater from the emergency spillway during the 100-year storm event (and the spillway was not included in the basin's hydrology model). Neither basin should experience stormwater discharges from the emergency spillways for any storm event, including the 100-year storm event.

28. *The exfiltration rate used in the hydrology modeling of Basin #1 must be revised to 1.02 in/hr, the Rawl's rate for sandy loam soils.*

Acknowledged. The hydrology modeling has been revised. The stormwater basins now use a Rawl's rate of 1.02 in/hr.

29. *The Engineer must revise the Pre-Development Plan and Post-Development Plan for the following reasons: the drainage plans must include the limits of each catchment in their entirety and the areas labeled on the Plans must be consistent with the values used in the hydrology calculations (specifically, the areas listed on the Plans for catchments DA #3E, DA #2P, and DA #3P do not match what was used in the hydrology calculations).*

The Pre-Development Plan and Post-Development Plan were revised to include the limits of each catchment in their entirety. The area label listed on the Pre-Development Plan for catchment DA #3E was revised and is now consistent with the hydrology computations. The areas labeled on the Post-Development Plan must be revised to be consistent with the values used in the hydrology computations, specifically catchments DA #2P, DA #3P, DA #4P, and DA #6P.

Also, the Engineer must revise the post development catchment delineations at Lots 24, 25, 39 and 46. The Post Development Plan shows two unlabeled subcatchments at these lots but the topography shows that runoff from these lots will flow to Audrina Lane and therefore these two catchments are part of DA #3P.

30. *The Engineer must revise the design of the sediment forebay inlet pipe. As currently designed, the inlet pipe is at the bottom of the forebay. As sediment accumulates within the forebay, the inlet could become blocked thus preventing stormwater from entering the sediment forebay. The Engineer must provide enough vertical clearance between the bottom of the forebay and the inlet pipe invert to allow for sediment to accumulate within the forebay. Also, the proposed diverter manhole labels the pipe to the forebay as six-inch diameter pipe and the plan view labels this*

pipe as an eight-inch diameter pipe. The plans must be revised to show a consistent pipe size.

Acknowledged. The pipe was raised to be one foot above the bottom of the forebay and the diverter manhole was eliminated.

31. *The Engineer must provide evidence to demonstrate that the proposed diverter manhole was designed to direct the required water quality volume through the forebay. Similarly, calculations must be submitted to model the stormwater flows into and out of the forebay and to calculate the peak water surface elevations during the two-year through the 100-year storm events.*

Acknowledged. The proposed diverter manhole was eliminated.

32. *A Stormwater Management Checklist must be provided.*

Acknowledged. A Stormwater Management Checklist was included with the revised Stormwater Report.

33. *The top of the berm for the infiltration basin is proposed to be elevation 381.00 feet. At this elevation, the width of the berm will only be approximately three feet. The top of the berm must be at least ten feet wide to provide reasonable access for maintenance equipment.*

Acknowledged. The plans were revised to provide a ten (10) foot wide access route around both infiltration basins.

34. *The Engineer must provide the following calculations: rip-rap apron sizing calculations, Basin #1 drawdown time calculations, required water quality treatment volume calculations and sediment forebay sizing calculations to demonstrate compliance with MassDEP Stormwater Management Standards 1, 3, and 4.*

The Engineer provided rip-rap apron sizing calculations, drawdown time calculations, and sediment forebay sizing calculations (for both basins) and the diverter manhole was eliminated (stormwater flow will not bypass the treatment train). However, the flowrate used for the Basin #2's rip-rap stone size calculation is incorrect (based on the hydroCAD results) and must be revised.

35. *The Engineer must revise the Total Suspended Solids (TSS) worksheet. The calculations cannot use a TSS removal credit for the second sediment forebay unless this forebay has been adequately sized. Second, the eighty percent TSS removal credit includes adequate pretreatment (i.e. the forebay up-gradient of the infiltration basin). As such, together the first forebay and the infiltration basin provide eighty percent TSS removal.*

Acknowledged. The TSS worksheet was revised. The two infiltration basin treatment trains (as currently designed) will provide 80% TSS removal.

General Engineering Comments

36. *The plans show a sidewalk beginning at the intersection of Audrina Lane and Institute Road, extending southerly along Institute Road and terminating north of the existing vernal pool. Consideration should be given to extending the sidewalk southerly along Institute Road from the currently proposed terminus to the intersection of Brooke Street to provide pedestrian access along Institute Road. Use of this section of Institute Road by pedestrians will be inevitable once the project is*

developed. In our opinion, the width of the pavement on Institute Road and the horizontal alignment of the road warrant that pedestrians should be separated from vehicular traffic. Please refer to Condition C6a of the Decision for Major Residential Permit MSRP 2014-10.

The Engineer responded that the area was reviewed in the field with the Conservation Commission Agent and it was determined that a sidewalk could not be constructed in the vernal pool area due to the impacts to the vernal pool. Potential alternatives to placing fill in or adjacent to the vernal pool could be explored (e.g. bridging the sidewalk over the vernal pool using a grated (or similar) decking material or locating the sidewalk on the opposite side of the street). We defer further consideration of this issue to the Planning Board and the Conservation Commission.

37. *Per standard practices, drainage pipes must be designed to have velocities that do not exceed ten (10) to twelve (12) feet per second (fps) when flowing full. The following drain pipes as currently designed will have velocities that exceed twelve (12) fps: the eighteen-inch pipe from DMH#11 to DMH#12; the thirty-six-inch pipe from DMH#16 to the diverter manhole; the thirty-six-inch pipe from the diverter manhole to the infiltration basin's inlet; and the thirty-six-inch pipe from the infiltration basin's outlet control structure to the headwall (which we recommend should have a velocity no greater than 10 fps because it's located at the discharge point). Also, Grafton's Regulations Governing Stormwater Management limit the velocity to a maximum of 10 fps.*

The Engineer has revised the drainage pipes which has resulted in lower velocities within the system, however the following two drain pipes (as currently designed) will have velocities that exceed ten (10) fps (based upon pipe slope, these pipes were not yet included in the Rational Method calculations): the 24-inch diameter pipe from the stormceptor to the proposed headwall and the 36-inch diameter pipe from Basin #1's outlet control structure to the proposed headwall.

38. *The Engineer must match either the pipe crown elevations or 0.8 pipe diameter elevations at manholes with changes in pipe diameter (unless a drop manhole is proposed, in which case the incoming pipes would be higher). For example, pipe inverts at DMH #4, DMH #8, and DMH #12 must be revised.*

The Engineer has revised the drainage system, but has not matched all of the pipe crown elevations or 0.8 pipe diameters at manholes where the pipe diameters change (specifically DMH #1, DMH#5, and DMH #15).

39. *The location of the outlet structure must be revised. According to the Plan View Basin Detail and the hydrology calculations, the inlet openings will be below the ground surface, preventing stormwater from draining out of the basin.*

The topography adjacent to the Basin #1 outlet control structure was revised and the inlet openings are now above the ground. However, the proposed grading is too steep (up to 1H:1V). The outlet structure needs to be moved farther into the basin and the grading revised to be no steeper than 3H:1V. Likewise, the location of and grading adjacent to the Basin #2 outlet control structure needs to be revised.

40. *Proposed Basin #1 does not appear to have any security or safety measures encompassing it. We defer to the Town of Grafton if it desires a fence around the*

basin. If a fence is desired, then a four-foot high fence should be considered. The Chain Link Fence construction detail on Sheet 26 shows a six-foot high fence, but the plans don't show where a fence is proposed.

Acknowledged. The plans now show locations for the chain link fences that surround both stormwater basins.

41. The "Typ. Precast Concrete Manhole Sanitary" construction detail on Sheet 26 must be revised to comply with the Town's standards. We understand that the frame must be EJIW Model No. 2007Z and the cover must be EJIW Model No. 2006A. The manhole must have a thirty (30) inch opening. If not already done, the Engineer should solicit input from the Grafton Sewer Department.

Acknowledged. The "Typ. Precast Concrete Manhole Sanitary" construction detail was revised to comply with the Town's standards.

42. The "Catch Basin" construction detail on Sheet 27 must be revised to comply with the Town's standards. We understand that the frame must be EJIW Model No. 5520Z, the grate must be EJIW Model No. 5520MB, and the catch basin hood must be an "Eliminator".

The "Catch Basin" construction detail was revised as requested. However, we (previously) cited a frame and grate for a cascade inlet instead of for a square-hole inlet. The model numbers will have to be revised to specify a 5523Z frame and a 5520M5 grate.

43. The "Precast Concrete Drain Manhole" construction detail on Sheet 27 must be revised to comply with the Town's standards. We understand that the frame must be EJIW Model No. 2114Z and the cover must be EJIW Model No. 2110A.

Acknowledged. The "Precast Concrete Drain Manhole" construction detail was revised to comply with the Town's standards.

44. The "Typ. Double Grate Catch Basin" construction detail on Sheet 27 must be revised to comply with the Town's standards. We understand that the frame must be EJIW Model No. 5448Z and the grates must be EJIW Model No. 5520M5.

Acknowledged. The "Typ. Double Grate Catch Basin" construction detail was revised to comply with the Town's standards.

45. Sheet 26 shows two (2) PVC Pipe Trench Section construction details. The Engineer must either remove one of the construction detail if it is superfluous or revise the construction details to indicate to what each construction detail applies.

Acknowledged. The extra construction detail was removed from the plan set.

46. Sheet 3 shows a utility and snow easement on Lot 39, however this easement is not shown on Sheets 14 and 19; the plans must be revised to show all of the easements.

Acknowledged. Sheets 14 and 19 were revised.

47. The "Ductile Iron Pipe Trench Section" construction detail on Sheet 26 shows five (5) feet minimum cover between the top of the pipe and finished grade. Based on the plan and profile sheets, GEI estimated that the ductile iron water main does not have five feet of cover at the following locations: Brooke Street Sta. 4+28 to Sta. 12+30 and Sta. 13+00 to Sta. 19+00; and Dylan Way. The plan and profile sheets need to be revised to provide five feet of cover or the Grafton Water District (GWD) needs to be consulted relative to cover less than five feet.

Acknowledged. The plan and profile sheets were revised. The water main is now shown to have five (5) feet of cover between the top of the pipe and finished grade.

48. Sheet 27 shows an illegible "Street Light Detail"; the Engineer must revise this construction detail. Also a construction detail for the luminaires needs to be provided. The engineer must coordinate the proposed pole and luminaires with the Grafton Department of Public Works.

Acknowledged. Sheet 31 shows an enlarged "Street Light Detail".

49. The Engineer must revise the sewer and/or drain design following the reasons: on Sheet 17 there is a conflict or near conflict between CB#29 and the eighteen-inch reinforced concrete drain pipe; and on Sheet 18 there is a conflict or near conflict between CB#26 and the eight-inch polyvinyl chloride sewer pipe.

No sewer and/or drain design revisions were made to solve these potential conflicts.

50. The Engineer must revise Sheet 23. There are two "26' " dimensions in the road that aren't needed as there is no gravel shoulder on the west side of Institute Road.

Acknowledged. The "Institute Road Improvements Plan" (now Sheet 25, formerly Sheet 23) was revised to remove these two "26' " dimensions.

51. The Engineer must revise the eighteen (18) inch drain pipe shown on the profile view of Sheet 17. The drain pipe is not drawn to the right scale between DMH #8 and DMH#10.

The pipes were revised to fifteen (15) inch diameter; however they were still shown incorrectly. The pipe heights are incorrect between DMH #8 and DMH #9 and only part of the top line for the pipe was drawn between DMH #9 and DMH #10.

52. On Sheet 23, STOP and STOP AHEAD signs need to be added in accordance with the last paragraph of Greeman-Pedersen Inc.'s correspondence dated September 16, 2016.

The "Institute Road Improvements Plan" (now Sheet 25, formerly Sheet 23) was not revised to include STOP and STOP AHEAD signs.

General Comments

53. Sheet 8 must be revised to include the utility easement designated for the proposed sewer pump station.

The utility easement for the proposed sewer pump station is shown on Sheet 8, however the bearings and distances are missing from this easement. The bearings and distances need to be included on the plans along with bounds at the easement corners.

54. Prior to the plan endorsement, all sheets of the plan set, including the cover sheet, must include the statement "See Sheet ____ for Planning Board Conditions of Approval", and the conditions must be inscribed on said sheet.

No further comment.

55. *Sheet 19 must be revised to identify the road labeled as Road "C" as Dylan Way to be consistent with the other plan sheets.*

Acknowledged. Sheet 19 was revised to identify the road as Dylan Way.

56. *On Sheet 9, Lot #14 was inadvertently labeled "Lot #13".*

Acknowledged. Sheet 9 was revised; Lot 14 is now labeled as such.

57. *On Sheet 24, Note 18 references "Bellingham" and Note 21 references "Ashland". On Sheet 27 the "Precast Concrete Manhole Detail" references "M.D.P.W". The Engineer must remove all references to Towns and DPW's other than Grafton.*

It appears that the changes to the notes on the "Erosion Control Plan" (Sheet 27, formerly Sheet 24) were made but the text is illegible (see Additional Comments section). We will confirm the revisions when revised plans are submitted.

58. *GEI did not review the design of the sewer pump station or the sewer main design. We understand that the Grafton Sewer Commission will review the subdivision's sewer design.*

No further comment.

59. *GEI has not reviewed the plans with respect to the water main design. We understand that the Grafton Water District will review the subdivision's water design.*

No further comment.

Additional Comments, March 21, 2017

60. **The text throughout the plans is blurry and illegible, particularly the drainage and sewer systems' rim and invert elevations (plan and profile sheets), the Erosion and Sedimentation Control notes on Sheet 27, and the construction detail text on Sheet 29. There appears to be a problem with the way the plans were scanned or printed. Any new plans submitted must be clear and legible.**

61. **Sheets 11 and 13 show proposed drainage lines, catch basins, and manholes throughout the wooded property to the north of Lots 17 through 23. These drainage elements are not part of the project; they appear to be left over from project design and drafting. Also, on Sheet 8, just south of the proposed sewer pump station easement and above the isolated wetlands there is a bearing and distance that do not relate to a property line. These drainage elements, bearing and distance need to be removed from the plan set.**

62. **The Post-Development Plan shows that the Subcatchment DA #1P discharges to a water quality swale treatment system. The Engineer must submit calculations to demonstrate that the proposed water quality swale treatment system (at the outlet pipe near the intersection of Brooke Street and Institute Road) is adequately sized to handle the required water quality volume.**

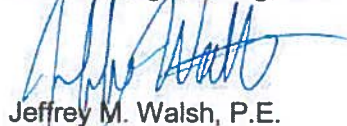
63. **Infiltration Basins #1 and #2 must be revised to include one-foot of freeboard between the top of the berms and the 100-year peak water elevations. As currently proposed there will be 0.61 feet and 0.34 feet of freeboard at Infiltration Basins #1 and #2, respectively. The freeboard reported here**

- accounts for the Basin #2 elevation discrepancy between the plans and the hydrology computations.
64. The design plans show that a proprietary treatment device (Stormceptor) for TSS removal is now proposed and as such the Engineer must provide backup calculations to demonstrate that the device was adequately sized (i.e. calculations in accordance with MassDEP's "Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing..." Also, TARP and/or MASTEP Performance Evaluation data must be submitted to support the proposed TSS removal efficiency.
 65. The hydrology calculations show that subcatchment DA #6P (373,817 square feet) will discharge stormwater to a single-inlet catch basin. The single-inlet grate will not have adequate hydraulic capacity. Considering the calculated flowrates, up to 22 cubic feet per second (during a 100-year storm event), an alternative inlet(s) to the drainage system needs to be considered. The Engineer also must provide calculations to demonstrate that the inlet will have adequate hydraulic capacity.
 66. The notes for Basin #2's sediment forebay (on Sheets 12 and 31) use the wrong elevations and volume. These notes need to be revised to reflect the actual elevations and volume.
 67. The storage in Infiltration Basin #2 was modeled in HydroCAD using elevations ranging from elevation 369 to elevation 375. The plans (Sheets 12 and 31) show that the basin will be constructed between elevations 370 and 376. The plans or the HydroCAD model must be revised so that the elevations are consistent and are coordinated with the basin's outlet elevations.
 68. On Sheet 30, the labeling of Infiltration Basin #1's outlet control structure outlet pipe size is inconsistent. In two locations, the pipe is labeled as being 24-inch in diameter and in a third location it is labeled as being 36-inch in diameter. The diameter of the outlet pipe must be consistent throughout the plans. Also, the plans label this pipe as being a PVC pipe, but RCP is required. Finally, this pipe is labeled as having a slope of 2.6% however we calculated a slope of 8% (based on invert elevations and length of pipe), which is too steep. A slope of 8% on the outlet pipe would result in an excessively high water velocity. As discussed in comment #37, the velocity must not exceed ten (10) fps. The Engineer must revise the outlet pipe as necessary.
 69. On the "Plan View Basin #2" construction detail (on Sheet 31), the invert elevations for the proposed headwall into the forebay and the DMH directly upstream of the headwall are incorrect (roughly ten feet higher than the adjacent ground elevations). The Engineer must revise these elevations.
 70. The diameter of the pipe between DMH-16 and DMH-17 is not labeled consistently on the "Plan View Basin Detail" construction detail (Sheet 30). The upstream manhole lists the invert out as a 36-inch pipe, the downstream manhole lists the invert in as a 24-inch pipe, and the plan view labels the pipe as a 36-inch pipe. The Engineer must revise the plans to consistently label the diameter of this pipe

71. The Engineer must provide a TSS worksheet for the water quality treatment train (Subcatchment DA #1P) which demonstrates that eighty percent TSS is removed.
72. As shown on the Plan View Basin Detail on Sheet 30, the emergency overflow elevation for Infiltration Basin 1 is set at 379.5 and the top of berm elevation is set at 380. The plans must be revised to provide a minimum elevation difference of one foot as measured between the emergency overflow spillway and the top of berm. Likewise, the forebay's spillway must also be one foot lower than the forebay's berm.
73. A proprietary stormwater treatment unit is proposed at the Basin #1 forebay area. This unit will require maintenance by a (heavy) vacuum truck. The treatment unit needs to be located adjacent to the roadway for ease of maintenance access.
74. On Sheet 26, in the Phase 2 phasing narrative Lot 18 can't be released until the lot's access can be gained from a paved road. As currently proposed, road construction will occur on Brooke Street in front of this lot's driveway after the lot is released.

We trust this letter addresses your review requirements. Feel free to contact this office if you have any questions or comments.

Very truly yours,
Grayes Engineering, Inc.



Jeffrey M. Walsh, P.E.
Vice President

cc: Peter Lavoie; Guerriere & Halnon, Inc.
Normand Gamache, PLS; Guerriere & Halnon, Inc.